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United States Department Of Agriculture | Forest Service | Shasta-Trinity NFs

Reply To: 3420 Date: August 15, 1988

Subject: Evaluation of Annosus Root Disease on McCloud RD

To: District Ranger, McCloud RD

Annosus root disease, caused by Heterobasidion annosum, is of increasing concern in the eastside pine type of California. This disease affects all species of conifers; however, at this time it appears to be having its greatest effect on ponderosa and Jeffrey pines. Although black stain root disease (Ceratocystis wageneri) has received more attention on the McCloud Ranger District because of its current impacts, the effects of annosus root disease on stand management and timber productivity in the long-term could be greater.

A primary avenue for the initiation of annosus root disease centers is through newly created stumps. A stump treatment using borax is available that reduces the success of infection. The McCloud Ranger District recently initiated direction to treat all conifer stumps during timber sales. This was decided based on the increasing numbers of trees being identified as killed by H. annosum on the District and the known incidence of the disease in the eastside pine on adjacent Forests. They desired additional information on the incidence of the disease to support this decision. Specifically, they want to know if all species in all stand types need to be treated. Only pine stumps were examined in this survey. The efficacy of treating true fir stumps is uncertain (see 3400 memo from ARF, SPF to Forest Supervisors, May 28, 1987, "Borax Treatment of True Fir Stumps in Timber Stands"). We can provide other information outside of this survey to help answer this question.

In the spring of 1988 we initiated surveys to determine the incidence of H. annosum in several areas on the McCloud Ranger District. The objective of these surveys was to determine the level of annosus root disease in eastside pine and mixed conifer stands that had previously had harvesting activity on the District. By examining the percentage of stumps that were infected following former sales, we assume that infections during any new timber sales will probably be at the same level or higher.

Areas were identified which had been harvested about 10 years ago. This period of time was selected because it was believed the fungus would still be active in most infection centers and stumps would have sufficiently decayed so that the fungus would have produced recognizable fruiting bodies. Areas were identified as either eastside pine or mixed conifer type.

Sale areas were located on the ground. A one-chain-wide strip was surveyed along a randomly selected transect in each area. All ponderosa-Jeffrey pine stumps greater than or equal to 12 inches diameter were examined in the strip. Fifty stumps were examined in each sale area. The examination involved

dissecting each stump and looking for evidence of H. annosum. The presence of fruiting bodies of the fungus provided confirmation. Six sale areas were surveyed, four in the eastside pine type and two in mixed conifer.

RESULTS

The following stands were examined.

Lonesome	eastside pine	T. 39 N R. 2 W	Section 2
Sink	eastside pine	T. 40 N R. 1 W	Section 27
Kinyon	eastside pine	T. 40 N R. 1 W	Sections 24, 25
Island	eastside pine	T. 41 N R. 3 E	Sections 2, 11
Caves	mixed conifer	T. 40 N R. 3 E	Sections 16, 21
Elk	mixed conifer	T. 40 N R. 2 W	Sections 22, 23

Several other stands were dropped from consideration because of insufficient numbers of pine stumps. Infected stumps were identified in 5 of the 6 stands. The average level of stump infection for the eastside pine stands was 18%. The following table presents the survey results for the stands examined.

STAND	TYPE[1]	NO. STUMPS INFECTED	% STUMPS INFECTED
Lonesome	EP	9	18
Sink	EP	12	24
Kinyon	EP	8	16
Island	EP	7	14
Caves	MC	2	4
Elk	MC	0	0

[1]EP=eastside pine; MC=mixed conifer

Stump diameter was also measured during the survey. Data were grouped by 4 inch diameter classes. Figure 1 presents a summary of the percent stumps infected by diameter class for the eastside pine stands. Too few infected stumps were found in the mixed conifer type to make a similar evaluation.

Tree mortality was only observed in one root disease center. However, recent logging activity, including clearcuts, in several of the units had removed evidence of most mortality.

DISCUSSION

The levels of stump infection by H. annosum in eastside pine on the McCloud Ranger District are a little higher than those on the Lassen National Forest (average of 5 to 15%). They are considerably less than levels found on parts of the Modoc National Forest (average of 50%). These estimated levels are conservative. Additional stumps may have harbored infections, but were not identified as such since only stumps with conks were counted. Overall, these infection levels indicate the potential for significant future loss if borax treatment is not performed.

The amount of damage observed during the survey from this disease was not high, but recent cutting activity may have removed infected dead trees. Because of the persistence of this disease in infected woody tissue, damage can be expected to occur sporadically for many years within each center. Although root disease centers vary considerably in size, on average it is estimated that each center will occupy about 0.1 acre of land. With this information and knowledge of the infection rate of new stumps (average 18%), the approximate area which may become affected in sale areas can be determined after the number of pines to be cut is known. The lost productivity due to annosus root disease can be estimated for these sales if borax treatment is not performed.

The stump diameter information provides additional circumstantial evidence of the relationship between stump diameter and the likelihood for infection. Research has found that stumps less than 8 inches in diameter have a very low probability of infection in this general area. Field observations suggest that stumps between 8 and about 18 inches diameter may not support active root disease centers. This study suggests that stumps less than 14 inches in diameter do not support active disease centers. However, until more conclusive information is available, the present policy of treating all pine stumps in commercial sales should be followed.

The low levels of infection in the mixed conifer stands suggests that borax treatment may not be necessary in these situations. However, only two stands were examined and the proportion of pine stumps was low in both. Additional examination of this forest type should be done to provide a more definitive answer.

Based on the information from this survey, it appears appropriate to continue the District's policy of boraxing all pine stumps. Although we did not examine stumps of other species of pine, such as lodgepole, they are known to be susceptible to the fungus and should also be treated.

/s/

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